Indium-Tin-Oxide (ITO) Coated Substrates

Technical Data Sheet

Refractive index values

We present the refractive index data for the ITO coating. It is the refractive index value used for calculating our ITO film performances. The ITO coatings are sputtered and therefore are denser than coatings made by vacuum evaporation.

Wavelength (nm)	Refractive Index	Extinction Coefficient
400	2.15	0.025
425	2.1	0.018
450	2	0.01
506	2	0.0087
600	2	0.0065
650	2	0.0044
700	2	0.0042
750	2	0.0042
800	2	0.004
1065	2	0.004

Coating resistivities and thicknesses are available as standard products:

Float glass (soda lime) Microscope Slides

Unpolished (standard microscope slides)

Sheet resistance and ITO thickness:	**Nominal transmittance:**
70-100 ohms/square (70 NM)	Greater than 88%以上
30-60 ohms/square (140 NM)	Greater than 88%
15-30 ohms/square (350 NM)	Greater than 85%
8-12 ohms/square (700 NM)	Greater than 83%

Polished

Sheet resistance and ITO thickness:	**Nominal transmittance:**
30-60 ohms/square (140 NM)	Greater than 88%
15-30 ohms/square (350 NM)	Greater than 85%
8-12 ohms/square (700 NM)	Greater than 83%

Fused quartz microscope slides (GE 124):

Sheet resistance and ITO thickness:	**Nominal transmittance:**
Less than 100 ohms/square (70 NM)	90%
10-20 ohms/square (700 NM)	85%

Polyester (PET) Polymer Film

Sheet resistance and ITO thickness: (Cold Only)	**Nominal transmittance:**
60-100 ohms/square (70-140 NM)	Greater than 88%
8-12 ohms/square (700 NM)	Greater than 83%

High Temperature Applications:

We have some test data on our ITO coating subjected to high temperatures for 3 x 12 hours cycles. Changes in resistance was observed and were found to be larger as temperatures got higher.

160 ℃	3 Cycles	2.5% Sheet Resistance Change
210 ℃	3 Cycles	4% Sheet Resistance Change
250 ℃	3 Cycles	16% Sheet Resistance Change

We do not recommend using this product at temperatures higher than 300 ℃.

Indium-Tin-Oxide (ITO) Coated Microscope Slides

How to select the right slide for you

A) Substrate materials (e.g. glass, quartz, plastic, etc)

Select from the following choices in substrate materials:

- **Float glass (soda lime)**

  These are what are generally called "normal microscope slides" and are available either as a) polished or b) unpolished. The main reason one would worry about polishing, if if they needed to have the ultimate in surface flatness, since that parameter is improved greatly as a result of the polishing. We can report the following specifications for flatness:
- **Unpolished:**

  Typical surface roughness is <0.15 µm/20 mm, peak to peak, for 1.1 mm microscope slides
- **Polished:**

  Typical surface roughness is <0.05 µm/20 mm, peak to peak, for 0.7 mm microscope slides
- **Fused quartz**

  All quartz microscope slides are fabricated from GE 124 and are the same quartz slides.

  The question of flatness often times arises and the quartz slides are made to a typical flatness of 2-4 "bands" per in., but quartz in 1 mm thickness can bend under its own weight. When placing an optical flat on top to measure flatness, the slide or cover slip will conform to the flat, but when on top of an optical flat, it does not weigh enough to flatten itself out. We are told that slides and cover slips can not be made with greater flatness than 2-4 "bands" per in.
- **Plastic**

  We are still developing this part of the product line.
- **Polymer film**

  We can offer polyester (PET) film in 200x200mm x 0.2 mm in thickness. These ITO-coated films have the major advantage of being able to be bent to extremely small radii of curvature (less than 10 mm) without even the slightest hint of deterioration of the ITO-coating. This is made possible, at least in part, because of the superior SPI Supplies technology in terms of adhesion of the ITO coating to the PET substrate. This form of our ITO coating technology is of value to anyone in need of flexible, transparent electrodes. These ITO-coated PET substrates can be cut down to their needed size with a razor blade or good scissors.

B) Selection of the substrate size

All substrates are available in a number of standard sizes as well as customer sizes to meet special requests for customers with special needs.

- **Float glass, unpolished:** Standard substrate sizes: 25x75 mm; 50x75 mm
- **Float glass, polished (all are 0.7 mm thick):** Standard substrate sizes: 25x75 mm; 50x75 mm
- **Fused quartz (GE 124):** Standard substrate sizes: 25x25 mm; 25x50 mm; 25x75 mm
- **Polymer film (polyester, PET):** 75 x 25 mm x 0.2 mm thick

C) Selection of the ITO coating resistivity

Coating resistivities and thicknesses are available as standard products:

Float glass (soda lime) Microscope Slides

Unpolished (standard microscope slides)

Sheet resistance and ITO thickness: Nominal transmittance:

70-100 ohms/square (70 NM) Greater than 88%

30-60 ohms/square (140 NM) Greater than 88%

15-30 ohms/square (350 NM) Greater than 85%

8-12 ohms/square (700 NM) Greater than 83%

Polished

Sheet resistance and ITO thickness: Nominal transmittance:

30-60 ohms/square (140 NM) Greater than 88%

15-30 ohms/square (350 NM) Greater than 85%

8-12 ohms/square (700 NM) Greater than 83%

Fused quartz microscope slides (GE 124):

Sheet resistance and ITO thickness: Nominal transmittance:

Less than 100 ohms/square (70 NM) 90%

10-20 ohms/square (700 NM) 85%

Polyester (PET) Polymer Film

Sheet resistance and ITO thickness: (Cold Only) Nominal transmittance:

60-100 ohms/square (70-140 NM) Greater than 88%

8-12 ohms/square (700 NM) Greater than 83%

D) Selection of the busbar

With or without busbar is the question. We will try to answer that question in the following several paragraphs.

In order to gain the benefit of the ITO coating, one does need the ability to make electrical connections from the coating to the power source. This can be done by the experimenter or the slides can be purchased with the busbar already applied and ready to use.

There are a number of different qualities of the busbar that one could apply. As a standard product, we offer the slides with a silver line silk screened on at the edge (or elsewhere is desired) that exhibits, when cured and dried, exhibits a surface resistivity of better than 0.2 ohms / square. The busbar is typically three micrometers in thickness with a three millimeter width.